UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING
Washington, D. C.

FIELD LETTER NO. 31
Sept. 15, 1917.

Logan Waller Page, Director.
P. St. J. Wilson, Chief Engineer; J. E. Pennybacker, Chief of Management; Samuel Fortier, Chief of Irrigation Investigations; S. H. McCrory, Chief of Drainage Investigations; E. B. McCormick, Chief of Rural Engineering; Prevost Hubbard, Chief of Tests.

ROLL OF HONOR.

Employees of this Office Who Have Entered Military Service.

	Office Title	Military Title	Post of Service.
Wallace Ashby,	Barn Architect,	1st Lieutenant,	Engineer Officers' Reserve Corps, Admiral, Md.
F. Russell Lyons,	Jr. Highway Engineer,	2nd Lieutenant,	Engineer Officers' Reserve Corps, American University, D. C.
W. B. Booth,	Jr. Drainage Engineer,	2nd Lieutenant,	Engineer Officers' Reserve Corps, Ft. Sam Houston, Tex.
Q. C. Ayres,	Jr. Drainage Engineer,	2nd Lieutenant,	Engineer Officers' Reserve Corps, American University, D. C.
O. N. Powell,	Highway Engineer,	Captain,	Vancouver Barracks, Washington.
Dan S. Helmick,	Jr. Drainage Engineer,	1st Lieutenant,	Somewhere in France.
Harris E. Petree,	Clerk and Stenographer,		Aviation Corps, Mineola, Long Island, N.Y.
I. G. Kohlmeier,	Clerk and stenographer,	Dental Surgeon, U. S. Navy.	U. S. S. Seattle.
A. L. Hooper,	Jr. Highway Engineer,	2nd Lieutenant,	Engineer Officers' Reserve Corps, Camp Devens, Ayer, Mass.

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[illegible]

[illegible]

[illegible]

[illegible]

ROLL OF [illegible]

Employees [illegible] Civilian [illegible] Naval Military Service.

Civil	Military Title	Post
[illegible]	[illegible] 1st Lieutenant	[illegible]
F. Russell Lyons, Jr.	Highway [illegible], 2nd Lieutenant	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

P. A. Rideout,	Jr. Highway Engineer,		142 Massachusetts Engineer Corps.
R. E. Toms,	Sr. Highway Engineer,	Captain,	Officers' Training Camp, Ft. Benjamin Harrison, Ind.
Wm. A. McCalla,	Sr. Highway Engineer,	Major,	In Charge, Battalion of Road Engineers, Ayer, Mass.
Wm. H. Rhodes,	Sr. Highway Engineer,	Captain, (Drafted).	Engineer Officers' Reserve Corps, Ayer, Mass.
Wells A. Hutchins,	Asst. Irrigation Engineer,	Private,	Angel Island, Cal.
F. S. Miller,	Clerk,		
J. H. Skeggs,	Sr. Highway Engineer,	Captain,	Engineer Officers' Reserve Corps, Calif. Training Camp.
Geo. R. Boyd,	Sr. Drainage Engineer,	Captain,	Officers' Training Camp, American University, D. C.
J. H. Haswell,	Sr. Drainage Engineer,	Captain,	Officers' Training Camp, American University, D. C.
J. C. Stirton,	Instrument Man,	Private (Drafted)	Rockford, Ill.
C. E. Proudley,	Laboratory Asst.,	Private,	Coast Artillery, Ft. Washington, Md.
H. H. Barrows,	Sr. Drainage Engineer,	Captain,	Officers' Training Camp, American University, D. C.
P. T. Simons,	Sr. Drainage Engineer,	Captain,	Officers' Training Camp, American University, D. C.
C. F. Bessee,	Civil Engineer Draftsman,	Private, (Drafted)	American Lake, Wash.
Guy L. Smith,	Jr. Drainage Engineer,		Officers' Training Camp.

L. A. Jones,	Sr. Drainage Engineer,	Captain	Officers' Training Camp American University, D. C.
Carl Rohwer,	Asst. Irrigation Engineer,	Private, (Drafted)	Ft. Collins, Colo.
Albert L. Lane,	Jr. Drainage Engineer,		Officers' Training Camp, Ft. Oglethorpe, Ga.
C. S. Miller,	Draftsman,	Private,	Anniston, Ala.
I. D. Lucal,	Clerk and Stenographer,	Private,	Chicago University Hospital Corps, Allentown, Pa.
A. C. Dunn,	Jr. Highway Engineer,	2nd Lieutenant,	Inactive.
Chas.H.Moorefield,	Sr. Highway Engineer,	Lieutenant,	U. S. Navy.
H. H. Mac Pherson,	Chief of Survey Party,	1st Lieutenant, (Drafted)	Engineer Officers' Reserve Corps.
J. D. Fauntleroy,	District Engineer, 6th District.	Major,	Resignation Accepted.
W. G. Franks,	Clerk,	1st Lieutenant,	Signal Corps, Ft. Oglethorpe, Ga.
I. R. Grosvenor,	Supt.,Road Construction,	Commissioned, (Drafted)	Engineers' Reserve Corps.
E. S. Alderman,	Jr. Highway Engineer,	1st Lieutenant,	Still with Office.
W. B. Gregory,	Irrigation Engineer, (With Drainage Division)	Major,	On way to France.
John H. Chapman,	Clerk and Stenographer,	Clerk,	U. S. Signal Corps.

FEDERAL AID.

State Legislation

Legislation enacted by the states of California, Delaware, Illinois, Indiana, Iowa, New York, and South Dakota, in 1917, has been held by the Solicitor to be sufficient to meet the requirements of the Federal Aid Road Act. All of the states now have been considered as to the sufficiency of their highway departments and their legislative assents to the Federal Aid Road Act, and it is practicable now for the Government to cooperate with every state.

Administration

A certificate was executed by the Secretary of Agriculture to the effect that all of the $150,000 deducted from the 1917 Federal Aid appropriation will be needed for administering the Act. The Solicitor has given an opinion to the effect that Federal funds may be considered expended within the meaning of the Federal Aid Road Act when the project agreement is entered into between the Secretary of Agriculture and the state highway department. This opinion will be helpful to such states as have been delayed in getting their work under way.

In answer to an inquiry from the Wisconsin Highway Commission, the Solicitor gave as his opinion that Federal funds could be expended in the construction of roads across Indian reservations. He called attention, however, to the fact that it has been the general practice in the construction of roads and bridges on Indian reservations for the Government either to appropriate the money out of funds on deposit in the Treasury to the credit of the Indians on the reservation, or to appropriate the money from Federal funds, subject to reimbursement from funds to be placed to the credit of the Indians in the future. It would appear, therefore, to be an administrative question in which all the

facts would have to be considered in order to reach a decision.

Section 1, of Article 6, of the Rules and Regulations, was amended to permit payment of Federal Aid for work done on projects prior to the execution of the project agreements in cases where project statements were approved prior to August 15, 1917.

PROJECTS

The following project statements were submitted to the Chief Engineer in August:

	Length in Miles:	Estimated Cost:	Federal Aid Requested:
From District No. 4:			
N. Dak. #1	17.00	$15,444.00	$ 7,722.00
" " #2	15.00	11,781.00	5,890.50
Minn. #18	7.50	32,297.00	15,000.00
Totals 3	39.50	$59,522.00	$28,612.50
From District No. 7:			
Mich. #1	9.922	123,080.54	61,540.27
Totals 1	9.922	123,080.54	61,540.27
From District No. 8:			
Ala. #11	0.75	14,032.70	7,000.00
" #13	5.50	22,834.35	11,417.17
" #14	9.37	26,370.33	1,866.65
" #15	4.30	21,665.44	10,832.72
S. C. #1	2.12	49,846.94	23,248.20
" " #2	14.90	132,706.68	48,577.87
" " #3	4.90	76,899.90	38,449.95
Totals 7	41.84	$344,356.34	$141,393.56
From District No. 9:			
Vt. #3	0.70	11,935.79	5,967.89
" #4	1.40	10,135.75	5,067.87
" #5	0.75	7,380.12	3,690.06
" #6	2.40	11,792.44	5,896.22
" #7	1.65	13,308.24	6,654.12
" #8	1.25	7,928.80	3,964.40
Mass. #5	3.24	78,185.25	32,400.00
Totals 7	11.39	$140,666.39	63,640.56

From District No. 10:

	Length in Miles:	Estimated Cost	Federal Aid Requested:
Md. #3	2.33	$52,349.90	$23,300.00
" #5	2.00	45,883.86	20,000.00
N. C. #15	14.55	15,131.60	7,500.00
Totals 3	18.88	$113,365.36	$50,800.00

The Secretary has approved the following project statements:

Alabama No. 2
Alabama No. 3
Alabama No. 6
Alabama No. 9

Colorado No. 1

Maryland No. 3
Maryland No. 5

Massachusetts No. 1
Massachusetts No. 5

New Hampshire No. 2
New Hampshire No. 4
New Hampshire No. 5
New Hampshire No. 6
New Hampshire No. 7
New Hampshire No. 8
New Hampshire No. 9

North Carolina No. 12
North Carolina No. 15

North Dakota No. 1
North Dakota No. 2

Vermont No. 3
Vermont No. 5
Vermont No. 6
Vermont No. 7

Virginia No. 4

Mr. E. R. Miller, Chief Clerk of the Denver office, met fiscal agents of the Forest Service at Ogden, Utah, and Missoula, Montana; also conferred with the state auditors at Boise, Idaho, and Salt Lake City, Utah, and with the county commissioners at Great Falls, Montana, regarding accounts and disbursements.

Bids were opened August 9 for construction work on Minnesota Project No. 2 and contract awarded for all work except surfacing which has been re-advertised.

District Engineer Hathaway spent several days in the Washington Office discussing the various phases of the work. He also made a trip to Pierre, South Dakota, at the request of Governor Norbeck to be present at the first meeting of the newly organized State Highway Commission of that state, and

upon request of the Secretary of the Highway Commission of North Dakota went to Bismarck and made suggestions concerning preparation and submission of project statements.

George C. Scales, S. H. E., made numerous inspections of Minnesota projects.

Inspections in North Dakota were made by Mr. F. D. Hudgins, S. H. E.

It is expected that work on Iowa Project No. 1 will be ready for letting this month and that at least two miles of the pavement may be completed before the close of the season.

Kansas, Oklahoma and Texas so far have submitted no project statements.

Surveys to determine the location of houses along Missouri Projects Nos. 1 and 2 within the corporate limits of Jefferson City, Joplin, and Webb City, as requested by the Solicitor, have been made and maps showing this data will be submitted soon.

A number of tentative projects in Nebraska were inspected by District Engineer Wonders in company with the State Engineer, and project statements for these roads are expected at an early date.

District Engineer Fauntleroy spent two days in Arkansas and two in New Orleans, Louisiana, advising with the Highway Departments of these states regarding Federal Aid projects.

Three Arkansas projects out of the thirteen proposed in that state have been forwarded to the Chief Engineer. If all thirteen should be approved the total Federal Aid allotment for Arkansas for the fiscal years 1917 and 1918 will be used up with the exception of about $30,000.00. Work is under way on No. 2.

[illegible]

Louisiana has submitted thirteen project statements to date: Nos. 1, 8 and 13 were forwarded to the Chief Engineer; No. 2 was reduced in amount at the request of the State Highway Engineer and upon his request also Nos. 3, 4, 5 and 6 were canceled. Nos. 7, 8, 9, 10, 11 and 12 were returned to the Highway Department for correction and additional information.

Edward P. Shuman, S. H. E., was in Louisiana all of August advising with the State Highway Commission, inspecting projects upon which Federal Aid has been requested, attending the opening of bids for proposed Federal Aid work and aiding the State Highway Commission in the preparation of project statements.

District Engineer Voshell conferred with the State Highway Departments of Indiana and Illinois relative to their five-year programs of work and general matters relating to Federal Aid, and with the Michigan State Highway Department concerning Projects 2, 3, 5 and 6. Later Illinois sent a proposed five-year program of work directly to the Chief Engineer.

District Engineer Bullen received and corrected project statements from Mississippi, South Carolina and Alabama, and forwarded, with favorable recommendations, Alabama Nos. 2, 3, 4, 5, 6, 9, 11, 12, 13, 14, 15, 16 and 17, and South Carolina Nos. 1, 2 and 3. The last three are for concrete or equivalent roads leading into cantonments.

Inspections in Lowndes County, Alabama, were made by Mr. McCalla, S. H. E., and in Georgia and South Carolina by W. H. Rhodes, S. H. E.

W. A. Crossland, S. H. E., was in charge of work at Camp Gordon, near Atlanta, Ga., during August.

Mr. McCalla has been in charge of road work at Camp McClelland, Anniston, Alabama, since August 13.

[illegible] project status to date:

[illegible] the Chief [illegible]

[illegible] State Highway [illegible] and [illegible]

[illegible] were cancelled. [illegible] 7, 8, 9, 10, 11 [illegible]

[illegible] and additional [illegible]

[illegible]

the State Highway Commission, inspecting projects [illegible]

[illegible]

[illegible] Commission in the [illegible]

[illegible] with the State [illegible]

[illegible] and [illegible] to [illegible]

[illegible] matters [illegible] to Federal 16, and [illegible]

[illegible] Projects 1, 3, 5 and 6. [illegible]

[illegible] of work directly to the Chief [illegible]

[illegible]

[illegible]

[illegible] 3, 4, 5, 6, [illegible]

[illegible] 2 and 3. The [illegible]

[illegible]

[illegible] County, Alabama, [illegible]

[illegible]

[illegible] in charge of work [illegible]

[illegible]

[illegible] charge of [illegible]

[illegible]

District Engineer Miller conferred with the Chief Engineer at Washington regarding Massachusetts projects, and also with the Highway Departments of New York and Maine.

Numerous inspections were made in District 9 in New York, Connecticut, Massachusetts, Vermont and Maine, and assistance was given the Vermont Highway Department in making up project statements, plans and specifications.

Mention was made in the July letter of the record time made by Iowa Project Statement No. 1, from the time it was received by the District Engineer from the State Highway Department, July 19, until it was approved by the Secretary, August 10, 1917, 23 days. This record has been surpassed in Mr. Bishop's district in the case of Maryland Project Statement No. 3, which was received by the District Engineer from the State Highway Department August 13 and approved by the Secretary August 23. The plans, specifications, and estimates were submitted shortly after the project statement and before approval of the latter. This course advanced the work on the project by many days.

Bids were called for on Pennsylvania Nos. 1, 2 and 3, and on Virginia No. 4. Contract was awarded on the latter.

National Forest Roads:

District 1 reported receipt of requests from the Forest Service for a preliminary investigation of the Santiam road in the Santiam National Forest, Linn County, Oregon, and a reconnaissance survey of the McClellan Pass, Ranier National Forest, King and Pierce counties, Washington. A copy of report on the reconnaissance survey of the Zigzag Government Camp Road, in Clackamas and

Hood River counties, Oregon, was forwarded to the Chief Engineer. The length of this road is 12.25 miles and the estimated cost of construction is $48,001.63.

Construction work was begun on the Hayfork-Hyampom survey, California.

Requests have been received in District 3 from the Forest Service for a reconnaissance survey on 25 miles of the Lolo Pass road in the Selway National Forest, Idaho county, Idaho. This is the Kooskia-Lowell section of the road. Requests also were received for preliminary investigations and reconnaissance surveys on the following roads in Idaho: Horseshoe Bend-Smith's Ferry, Boise and Valley counties; Ketchum-Clayton (Galena Summit Section), Blaine county; Soda Springs-Freedom, Bannock county; and Warren Wagon, Valley and Idaho counties.

Location surveys were begun on four projects in Mr. Whittaker's district: Sedalia Decker Springs, Colorado; Ephraim-Orangeville and Logan City, Utah; and Charleston-Jarbidge, Nevada; and similar work was continued during the month on the Wind River, Wyoming; Warm River-Yellowstone, Idaho; Belt Creek, Montana; Durango-Silverton and Monarch Pass Projects, Colorado. The work on the Monarch Pass and Durango-Silverton is more than half completed and that on the Sedalia Decker Springs, 90 per cent finished.

A. R. Brown, Superintendent of Road Construction, is in charge of construction work on the Teton Pass Road, Wyoming. This project will be closed down on account of lack of funds. This will leave about one mile of work uncompleted.

Survey on the North Fork project, Montana, was completed by H. A. Calkins, S. R. C., and that on the Yaak Valley continues with A. V. Williamson, S. R. C., in charge.

Reconnaissance survey of the West Gallatin road, Montana, was made by E. S. Wheeler, Highway Engineer.

A. E. Palen, Highway Engineer, inspected several projects in Colorado, and Charles H. Kendall, Senior Highway Engineer, inspected two in Utah, one in Nevada, one in Idaho and one in Wyoming.

A preliminary investigation report on the Stony River project in the Superior National Forest, Minnesota, was sent to the Chief Engineer from District 4. This road is 61 miles in length, is located in Lake and St. Louis counties, extending from Ely to Finland.

CONSTRUCTION AND MAINTENANCE

Object-lesson roads

J. H. Dodge, S. R. C., completed the construction of one mile of object lesson sand-clay road at Tarboro, N. C.

S. LeRoy Taylor, H. E., completed the construction of gravel roads in Sussex County, Va.; he returned to Emporia, Va., prepared the final estimates for the work he had superintended there, and proceeded to this Office.

C. E. Raynor, S. H. E., had charge of making a survey for a road proposed to be built from the railroad station at Montauk, L. I. to the newly located Coastal Air Station. This work was done at the request of the Bureau of Yards and Docks of the Navy Department.

Experimental Roads

F. A. Davis, J. H. E., completed the construction of a top soil road in Prince William Co., Va.

J. H. Dodge, S. R. C., has been assigned to supervise the maintenance of the Chapawamsic Road which Mr. Davis completed; his address is Dumfries, Va.

D. G. Haire, S. R. C., completed superintending the work under a contract for the repair of a bituminous-gravel concrete road between Alexandria and Gum Spring, Va., in Fairfax County.

Retreatments were given to the following experimental sections in Virginia and Maryland:

Alexandria Co., Va.

Section 1, Russell Road - 1153 gal. of O-49 and 60 cubic yards of gravel.

Section 2, Russell Road - 960 gal. of O-49 and 40 cubic yards of gravel.

Section 6, Russell Road - 270 gal. of O-49 and 12 cubic yards of gravel.

Section 8, Russell Road - 394 gal. of O-49 and 4½ cubic yards of gravel.

Section 2, Mt. Vernon Ave., was retreated with O-49 and gravel from a nearby gravel pit.

Section 16, Mt. Vernon Ave., 394 gal. O-49 and 21 cubic yards of gravel.

Section 15, Mt. Vernon Ave., was begun during August but not completed and final figures will appear in September news letter.

Montgomery Co., Md.

Section 3 of the Rockville Pike under the supervision of Patrolman Brewer was retreated and 22 barrels of O-53 and 140 cu. yards of Torpedo sand used as a top dressing.

Section 7 of the Rockville Pike had 46 barrels of O-54 and 125 cu. yards of Torpedo sand applied.

Superintendence of County Roads

F. A. Davis, J. H. E., has returned to Albemarle County, Va., to act as Superintendent of County roads. His address is Charlottsville, Virginia.

General

R. E. Royall, J. H. E., reported for duty at this Office on August 27. He is assisting in general office work.

A. S. Brainard, S. H. E., has resigned.

S. LeRoy Taylor, H. E., is engaged in the office and nearby field work.

ECONOMICS.

Economic Highway Survey

The economic highway survey was nearing completion for all of the State of Maryland lying east of the meridian passing through Washington, and arrangements were made to begin work in New Jersey in September. W. E. Rosengarten is in charge of the field work, and under a cooperative arrangement with the state highway department of Maryland, W. A. Friend is assigned to the work as a chief of party. E. L. Davis and W. H. Barton are assistants to Messrs. Rosengarten and Friend.

Maintenance Studies

J. L. Harrison has completed field studies of maintenance methods in Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, and New York, and in September will inspect brick roads in Ohio, concrete roads in Michigan and Wisconsin, limestone macadam roads in Kentucky, and then return to Washington for preparation of a bulletin in cooperation with E. W. James.

Highway Cost Keeping

The manuscript for the bulletin on Highway Cost Keeping was completed, but an opportunity arose for making a practical test of the system in connection with cantonment work at Ayer, Massachusetts. The system has been tried out and found to work satisfactorily, and the bulletin will go to the printer in September.

Highway Organization and Management Bulletins

B. E. Gray and G. G. Clark have taken up work on the Management bulletin series due to the fact that A. L. Luedke has been made assistant to the Director. The manuscript for the first of the series probably will be ready for the printer in October. This work is now being directed by M. O. Eldridge.

Between August 12 and 22, M. O. Eldridge made an inspection of proposed routes for the Bankhead Highway between Atlanta, Georgia, and Memphis, Tenn. This inspection was made in cooperation with a committee of three pathfinders selected by the President of the Bankhead Highway Association.

TESTS AND RESEARCH

Administration

Richard H. Lewis terminated his furlough taken for service in the Officers' Training Camp at Des Moines, Iowa, and returned to the office as assistant chemist on August 20th. A. M. Ergood, laboratory apprentice, resigned August 20. J. B. Cuningham, student assistant, resigned August 31. Lawrence Mason, student assistant, resigned on August 15.

Routine Tests and Analyses.

In August 14 samples of bituminous material were examined in the Chemical Laboratory; 179 samples of rock, sand, gravel, etc., were examined in the Physical Laboratory; and 52 samples were examined and classified in the Microscopic Laboratory.

Research upon the Properties of Dust Preventatives and Road Binders.

Little was accomplished in connection with the research work on bituminous materials owing to lack of help in the Chemical Laboratory. Upon his return, R. H. Lewis resumed work on experiments to determine the thickness of bituminous films on various types of mineral aggregates treated with bituminous materials of different consistencies.

Replies have been received from many manufacturers of bituminous materials to whom the new tentative specifications were submitted. Their comments and criticisms are being tabulated for use in remodelling the specifications before finally issuing them.

Experimental Bituminous Construction.

C. S. Reeve inspected various shell roads in Eastern Maryland and conferred with the road engineer of Talbot County about carrying out experiments in the surface treatment of such roads. At this time it appears possible that the office may cooperate with Talbot County in the construction of two experimental sections.

Benjamin Kamrass was assigned as plant inspector upon the repair and maintenance of the experimental bituminous gravel mix section of the Alexandria-Accotink Road. The inspection furnished by the laboratory on this maintenance work was of exactly the same character as on the original construction.

Non-bituminous Road Material Investigations.

Messrs. Jackson and Mitman were engaged all of August in field investigations of rock quarrying, crushing and screening plants in the New England and Middle Atlantic States. It is hoped this work will result in the accumulation of sufficient data to publish a short bulletin.

[illegible]

Soil Pressure Investigations.

Tests on sand fills using circular bearing blocks have been continued on fills of different depths. A digest is being made of the literature on the distribution of soil pressures and the method of measuring this distribution with the idea of shaping future tests in the most advantageous direction. Tests of pressures due to hydraulic fills were conducted and are now almost completed. The results to date have been plotted and show in a general way that the clay which is deposited from the original clay bearing water is still in liquid form and that the pressures are practically those due to a liquid of increased specific gravity.

Soil pressure cells have been buried back of the wing walls of the new 16th Street Bridge over the military road with an idea of obtaining earth pressures at later dates.

DRAINAGE INVESTIGATIONS.

Administration

S. H. McCrory, Chief, from August 19 to September 14, conferred with D. G. Miller at the South Chicago Office; discussed with Geo. R. Boyd and H. S. Yohe at Omaha their study of drainage assessment methods; visited the assistants gathering run-off data near Missouri Valley, Iowa, and Falls City, Nebraska; conferred with the engineer of the Monona-Harrison Drainage District, at Glenwood, Iowa, regarding proposed new work in that district; discussed the plans for the Clear Boggy River with the drainage dsitrict's attorney at Atoka, Oklahoma; examined the irrigation situation in the rice country of Texas and Louisiana with W. B. Gregory; conferred with G. A. Hart at the Montgomery office; at Jackson, Tennessee, discussed with C. E. Ramser the run-off investigations which the latter is conducting; visited ditch construction in the Cypress Creek Drainage District, Desha County, Arkansas; and inspected the Ottawa Lake Outlet Drain in Monroe County, Michigan, where D. G. Miller was beginning a drainage survey.

On September 3, Messrs. Miller and Yohe conferred with landowners in Clear Boggy River District in regard to the organization of that district.

S. W. Frescoln resigned July 7 to enter private employment.

Charles Lawrence resigned September 1 to enter private employment.

H. E. Middleton resigned September 1 to accept appointment in the Bureau of Soils.

H. M. Lynde, Senior Drainage Engineer, reported for duty September 1, after several weeks leave on account of illness.

Construction, Operation, and Maintenance

Reports received:

"Use of Segment Blocks in Drainage Work", by D. L. Yarnell.

"Value and Effect of Drainage Works in North Carolina", by P. T. Simons.

Recent drainage contracts have been let as follows:

In Dyer County, Tenn.

607,000 cu. yds., 60-ft. bottom, 12-13 ft. deep, at 7 cents.
1,741,000 cu. yds., 80-ft. bottom, 14-21 ft. deep, at 8.35 cents.
Lateral ditches at 13.5 cents to 18 cents per yard.
Heavy clearing on right-of-way, $15 to $20.
273,000 cu. yds., at 10.4 cents, including clearing right-of-way, by floating dredge; lowest bid by dry land machine at 12.5 cents.

In Gibson, Crockett & Madison Counties, Tenn.

1,018,000 cu. yds., 35-50 ft. bottom, 9-14 ft. deep at 7.49 cents.
Lateral ditches, 188,000 cu. yds. at 12.49 cents.
Clearing right-of-way at $19.00 to $19.90 per acre.

At Jefferson, Iowa.

Ditch about 10 ft. wide, dry land machine, 92,000 cu. yds., at 10.94 cent; 143,000 cu. yds., at 10.94 cents.

Cement Tile

44" tile at	$3,465	per M
30" tile at	1,575	" "
18" tile at	593	" "
12" tile at	215	" "
10" tile at	158	" "
8" tile at	105	" "
7" tile at	85	" "
6" tile at	74	" "
5" tile at	60	" "

Sewer Pipe

12", 50' at 40¢
10", 30' at 30¢
8", 70' at 25¢
6", 70' at 16¢

Digging, laying and backfilling.

Tile	Av. Depth	Per 100 ft.
44"	8.5 ft.	$120.00
30"	8.1 "	57.50
18"	7.4 "	26.00
12"	7.0 "	15.00
12"	9.2 "	30.00
10"	7.0 "	15.00
10"	8.7 "	27.00
8"	7.3 "	11.00
7"	6.4 "	9.00
6"	7.3 "	9.00

At Rockwell City, Iowa.

Cleaning open ditch: 236 stations, 26,400 cu. yds. at 39.93 cents.

Cement tile (Jan. 1917)	Labor for the tile.
1500 ft. 12" tile at $165 per M.	12" tile, 5.5 ft. deep, $12/100 ft.
1700 ft. 10" tile at $114 per M.	10" tile, 4.9 ft. deep, $ 8/100 ft.
2300 ft. 6" tile at 53 per M.	6" tile, 4.0-4.2 ft. deep, $6/100 ft.
	6" tile, 4.35 ft. deep, $7/100 ft.
	6" tile, 4.7 ft. deep, $8/100 ft.

Farm Drainage.

Reports upon 26 farm surveys have been transmitted to the farm owners since the last Field Letter; 13 farm reports are awaiting review in the office.

A report on the Measurement of Flow in Drain Tile has been submitted by D. L. Yarnell.

Overflowed Lands.

Reports transmitted:

Raft Creek district, White Co., Ark. (Prel) by O. G. Baxter.
Long Creek district, Oglethorpe Co., Ga. (Prel.) by J. V. Phillips.
Brushy Creek district, Madison Co., Ga. (Prel.) by J. V. Phillips.
Pond Creek and Dry Creek Districts, Colbert Co., Ala., (Prel.) by Jones and Hart.

Clear Boggy River Report, Okla.

Reports received:

Monona-Harrison Drainage District, Iowa. (Plan to enlarge district), by D. L. Yarnell.
Fork Creek District, Madison Co., Ga., (Prel.) by J. V. Phillips.
Little Mulberry River District, Gwinnet Co., Ga., (Prel.) by J. V. Phillips.

Swamp Lands.

Report transmitted:

Scott Brook, Sussex Co., N. J., (plan) by J. R. Haswell.

Report received:

Elma Township district, Richland Co., N. D., (plan) by D. G. Miller.

Tidal Marsh

Report transmitted:

E. W. Custis farm, Northampton Co., Va., (plan) by J. R. Haswell.

Irrigation in Humid Region.

After completing his trip of inspection in Florida, F. W. Stanley made several inspections in Alabama and Georgia. Arrangements were made for a few farm irrigation surveys to be made when the present crops have been removed. Further study of sewage irrigation in New Jersey was made by Mr. Stanley and G. A. Mitchell.

IRRIGATION INVESTIGATIONS.

Administration

Dr. Fortier returned to Washington from his summer inspection trip September 10.

Utilization of Water

Work at the Fort Collins laboratory has been held up by the entry into the army of four men who have been engaged on experiments there for some months past. This has resulted in a concentration of the Colorado force on the Poudre Valley surveys, the laboratory being closed temporarily. R. L. Parshall, I.E., has taken up the work at Eaton, Colo., formerly handled by Carl Rohwer, A.I.E., one of the members of the permanent staff who has gone to the army.

W. W. McLaughlin, I. E., has turned in his office report on the experiments carried on at Riverside, California, to investigate the capillary movement of soil moisture during 1915-1917. The report comprises 139 pages, with numerous illustrations.

On August 14 at Reno, Nevada, Dr. Fortier and F. L. Bixby conferred with State Engineer Scrugham and representatives of the University of Nevada in relation to cooperative work in irrigation and drainage. Owing to the many complications which have arisen in recent years over the use of water along the Humboldt River basin, it was recommended that the cooperative work for the current year be enlarged so as to include this basin. This recommendation has been approved by the office. The Humboldt River basin embraces some 328,000 acres of irrigated land or about 40 per cent of the total irrigated area of Nevada. The Cooperative work now under way for this basin will include, among other things, the preparation of a comprehensive plan for the better utilization of the land and water resources of this part of the state. The best reservoir sites are to be surveyed by the deputies of the state engineer and our representative, F. L. Bixby, and the data thus collected forwarded to the Washington

office for final review by the Chief of Irrigation Investigations, who will determine the best type to adopt in each case, and the approximate cost. Similarly, the bottom lands requiring drainage and flood protection will be studied by drainage engineers R. A. Hart and W. A. Kelly who will outline the work needed along these lines, and estimate the cost. When the engineering plans designed to take care of the storage of flood waters and the drainage and flood protection of bottom lands are completed, it is proposed to organize the basin into a number of irrigation districts and to impose on each an equitable assessment of costs in proportion to the benefits received.

The irrigation work in Placer and Nevada Counties, California, under the direct charge of J. B. Brown, was inspected August 18 and 19 by the Chief of the Division and Frank Adams, I. M. They also inspected the irrigation experiments conducted at Davis, California.

It is proposed to organize a conservation district for the better utilization of the waters of Kings River in California. The flow of this stream now waters about two-thirds of a million acres but by the construction of storage reservoirs, levees around Tulare Lake, and the drainage of water-logged areas, it is thought the total area which might be irrigated could be increased to one million acres. The salient features of this proposed district, including a reservoir site on Kings River capable of storing 600,000 acre feet of water, at a cost of $6,000,000, were examined on August 21 to 26 by State Engineer McClure, Major Norboe, deputy state engineer, Dr. Fortier and Frank Adams, in charge of cooperative irrigation work in California.

During the last week in August Dr. Fortier, F. L. Bixby and R. A. Allen, accompanied State Engineer Scrugham of Nevada and his deputy, S. Case, in a trip over the Humboldt River basin, Nevada, for the purpose of examining the chief reservoir sites and the valley lands in need of drainage and river flood protection.

Appliances and Equipment.

A. T. Mitchelson, I. E., spent most of August on investigations relating to spillways and wasteway structures on canal and reservoir systems, and in collection of field notes on chutes and drops. The Fast Canyon dam of the Davis and Weber Counties Canal company, the Wellington Lake and Cheesman dam of the Denver Union Water company, the Mammoth dam of the Price River Irrigation company, the Alice Lake and Minitare Reservoir dams of the U. S. Reclamation Service, the Utah State Power Plant at Logan, Utah, and the Hauser Lake Dam of the Montana Power company near Helena, Montana, were visited. He also studied the canal structures of the Cache Valley Irrigation Company, the Davis and Weber Counties Canal company, and the North Platte and Tri-State Irrigation projects in Nebraska

Tests on a new type of current meter, mentioned in last month's field letter, have indicated that mechanical improvements of the contact chamber are necessary before the meter will be ready for commercial use.

Flow of Water.

The field party composed of F. C. Scobey, S.I.E., T. H. McCarthy, A.I.E., and E. C. Fortier, I.A., returned to Washington September 10 and proceeded to Wilkes Barre, Pa., a few days later for the concluding tests of the season on a set of steel pipes at that place. Tests were conducted in August on the Deer Flat Forest pipe line of the U. S. Reclamation Service near Caldwell, Idaho, and on the two steel lines of the city water works of Ogden, Utah. It was found impossible to secure accurate data on two siphon pipes carrying an excessive quantity of air.

Customs, Regulations, and Laws.

The chief of the division, accompanied by F. G. Harden, I. E., and L. M. Winsor, Agent, attended a conference in Salt Lake City early in August for the purpose of discussing with the Governor, Attorney General, Secretary of State, and members of the Utah Water Rights Commission, matters pertaining to irrigation in Utah.

R. P. Teele, I. E., has left for a field study of the operation of the laws providing public control of irrigation in the Northwestern States and British Columbia. This Office is cooperating with the state of Utah in a study of the operation of irrigation laws, for the purpose of drafting a new irrigation code for that state. The province of British Columbia has a code of irrigation laws differing in some respects from those of our own Western states, and it is proposed to have Mr. Teele make a study of the working of this code and the conditions under which it is applied, as a part of a general study which will serve as a basis for drafting a code for Utah and preparing a report for this Office.

Drainage of Irrigated Lands.

A contract was let August 15 by the Worland Drainage District in the Big Horn Basin, Wyoming, for the laying of drain tile purchased by the district. The size of the tile ranges from 8 to 18 inches in diameter. It is to be laid at an average depth of 8½ feet. The construction cost of this district, inclusive of the contract just let, is $83,894. W. A. Kelly, D. E., is supervising engineer for this and several other drainage districts in Big Horn Basin.

RURAL ENGINEERING.

Domestic Water Supply and Sewage Disposal.

The manuscript and illustrations for a bulletin on "Farm Domestic Water Supply Systems" are nearing completion and will probably be transmitted during the next month.

A representative of the Office visited Gaylord, Clark Co., Va. to give advice in connection with the installation of a farm water supply system.

Farm Structures.

Drawings were prepared for sweet potato curing and storage houses, one having a capacity of 500 bushels and the other 5,000 bushels. Bills of material for these houses also were completed.

Drawings and bill of materials were prepared for granary and corncrib for the Dairy Division to be erected on the Experiment Farm at Iberia, La.

Designs for three types of root storage houses were prepared but are not yet available for distribution.

The remodeling of one of the Arlington Farm buildings to be used by the Color Investigation Laboratory, Bureau of Chemistry, was supervised during the month. Revised bids were requested for additions to the same building according to plans and specifications prepared by this office.

The rough draft of a bulletin on Farmstead Planning was completed; it will be necessary to revise the material, so that the date of completion cannot be given now.

Mechanical Problems.

Some work was done in connection with the contemplated series of bulletins on The Repair and Care of Farm Machinery; outlines of some of the series were prepared and some correspondence was had with specialists relative to the securing of data.

Conferences were held regarding the Farm Tractor Investigation which is to be made jointly by this Office and the Office of Farm Management; a joint questionnaire was prepared and is now under discussion.

The compressed air spraying outfit which was designed by the Office for the Bureau of Plant Industry is being assembled.

Correspondence and consultations were handled during the month on the following subjects:

Steam Jet Installation
Automatic Farm Gates
Land Clearing
Farm Implements
Corn Products Manufacture
Tractors
Ice House Design and Construction
Farm Electric Lighting Plants
Power Development of Streams
Water Supply and Pumping Problems
Alcohol Engines

Field Work.

Elmer Johnson left August 4 to attend a tractor demonstration at Fremont, Nebraska and to visit manufacturers of grain elevator machinery in order to secure data for use in the designing of a series of grain storage buildings.